PROPERTY OF: GRS

INSTRUCTIONS

TYPE 5542 DYNOGRAPH RECORDING ASSEMBLY

Beckman®

OFFNER DIVISION
of Beckman Instruments, Inc.
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OPERATING INSTRUCTIONS

OFFNER TYPE 542 DYNOGRAPH RECORDING ASSEMBLY

1.0 Power Connections. The Type 542 Dynograph is designed for operation from 115V, 60 cps power sources. The nominal power requirement is 25 watts; of this, the paper drive motor requires 10 watts. The maximum total power requirement with both pens fully deflected is 28 watts. The amplifier section of this recorder is fused, the maximum current being 200 milliamperes.

2.0 Ground Connection. The a-c line cord contains a ground lead. This lead is connected to the frame of the assembly enclosure, as are the signal input ground connections. When the input signal sources are connected to ground, the line cord ground lead should not be connected. When the input signal sources are not connected to ground, the line cord ground lead should be connected to a grounded conduit box, a ground wire, or to a water pipe. The Type 542 assembly should be grounded by either the signal source, or the line cord ground lead, but not by both.

3.0 Input. The signal input terminals are located along the right-hand section of the front panel. The two upper terminals are connected to Channel No. 1, the two lower terminals connect to Channel No. 2.

The upper terminal of each set connects to the high level input signal lead. The lower terminals of both channels are common, and should be connected to the grounded signal leads of the source.

4.0 Panel Controls.

4.1 General. The controls for Channel No. 1 are located left of the center of the panel; the controls for Channel No. 2 being mounted on the right-hand section of the panel.

4.2 Sensitivity Control. The 14 step sensitivity control provides the following range of sensitivities: .01, .02, .05, .1, .2, .5, 1, 2.5, 10, 20, 50, 100 volts/centimeter and OFF.

4.3 Gain Set Control. The gain set is a continuously variable vernier gain control to change the range of the sensitivity control by a factor of approximately .7 to 1.5. The sensitivity control reads directly when the gain set control is set to the Unity position.

4.4 Input Current Adjustment. This control is provided to balance out the d-c current which may flow in the input circuit, through the source. The d-c current is in the order of only a few microamperes. This control will remain in adjustment, once set, for sources with low or constant resistances.

4.5 Pen Centering. The pen centering control is provided to compensate for the small drift which may be encountered in the Type 542 Dynograph. Pen centering may be required after turning on the assembly, but should remain nearly constant once the operating temperature of the assembly has become stable. Applications with high source impedance, and with widely varying ambient temperatures may require more frequent adjustment of this control.

4.6 High Frequency Control. The high frequency control is convenient for providing the full range of frequency response of the Type 542 in the "IN" switch position, and providing an attenuation above 50 cps in the "OUT" switch position. The "OUT" position is convenient for d-c or low-frequency recordings by eliminating any spurious high frequency components which maybe in the input signal. The frequency response in this switch position is essentially the response of the Type 506 W writer unit.

The "IN" switch position inserts a frequency compensating network into the feedback circuit of the amplifier to provide a frequency emphasis above 50 cps to partially compensate for the response of the writer unit at the higher frequencies.

4.7 Dynograph Switch. The Dynograph switch controls the power to the amplifiers and paper drive. In the "OFF" position, the line power is disconnected from the paper drive motor and the amplifier power supply. In the "MOTOR" position, the line power is applied to the paper drive motor. In the "LIMITING" position the power is applied to the transistor amplifier; however, the voltage to the output stage is reduced to limit the maximum pen excursion to approximately three centimeters peak to peak.

5.0 Zero Adjustment. The following procedure should be used with the Type 542 to adjust the electrical zero of the pen to coincide with the mechanical zero position:

5.1 Adjust mechanical zero of Type 506W writer.

a. Set sensitivity control to 50V/cm.
b. Input: open circuit.
c. Turn Dynograph switch to MOTOR position.
d. Adjust mechanical zero position of the pen to the zero line on the recording paper, by means of the zero lever on the side of the writer unit. In case unlined paper is used, adjust pen to be parallel with writer unit.

5.2 Adjust centering control for zero.

a. Short circuit the input terminals of each channel.
b. Adjust sensitivity control for maximum sensitivity, .01 Volts/cm.
c. Turn Dynograph switch to "HIGH".
d. Center the pen by using the appropriate "Centering" control.
e. Turn sensitivity control to 50 V/cm. and Dynograph switch to "OFF", then remove the jumper across the input terminals.

Caution: Do not touch the high-level input terminal with the sensitivity control on maximum as the pen will be damaged or destroyed by the resulting wide excursions at 60 cps.

5.3 Adjust the input current for zero.

a. Input: open circuit
b. Sensitivity: Maximum, .01 V/cm.
c. Dyno Switch: HIGH.
d. Adjust "Input Current Adj." control for the zero position of each pen.

5.4 Check steps 2 and 3 until zero for both tests.

5.5 The Type 542 is then ready for operation.

6.0 Ink Recording.

6.1 General. The Offner curvilinear ink recording system is of value for applications requiring high recording accuracy. The ink system enables a wide frequency range to be recorded with a continuous fine-line tracing, and with the highest accuracy. The pen-to-paper frictional effects with this recording system are negligible, enabling small changes of amplitude of the signal to be recorded with fidelity, eliminating the influence of paper speeds in the amplitude of the recordings, and providing recordings with minimal hysteresis effects. Ink recording is the most economical of all the recording systems, the curvilinear ink paper being very economical. The recordings may be reproduced directly by the use of the Ozalid, or such similar processes.

6.2 Pens. The Offner all-metal pen is designed for exceptional small mass while being exceptionally rugged and durable in service. A stiff miniature tubing is the backbone of this pen. An exceptional hard metal tubing tip is employed to provide for a long service life. A very thin aluminum frame supports the assembly and is shaped to provide ample rigidity for all conditions of recording. Although the pens are rugged, care must be exercised when working around the writer assembly to not drop objects on the pens, or to strike the pens with the hands.

6.3 Pen Cradle. The pen cradle is designed to give a constant, but light, pressure to the pen to avoid unnecessary paper-to-pen friction. The cradle is designed for easy insertion or removal of the pen, yet to retain the pen regardless of the recording conditions.

6.4 Ink-Feed System. The Offner ink-feed system is designed to insure a steady free flow of the ink under all recording conditions. The inkwells and ink-feed tubing are transparent to enable a rapid visual inspection of the feed system.

The inkwells have an ample capacity for long periods of recording. The reservoirs may be raised, or lowered, on the writer unit to provide a gravity, or capillary ink-feed system. When recording at slow writing rates, the inkwell is placed in its lowest, or fully depressed, position for capillary ink flow. When recording fast rate-of-change phenomena, the inkwell is elevated to provide a gravity feed. A feature of convenience is the design of the inkwell cover which may be used as a pump for filling or draining the ink-feed system. By placing a finger over the vent hole in the center of the cover during a downward stroke, pressure is applied to the ink-feed system and the system is rapidly filled. Covering the vent hole on the upward stroke will provide a suction and draw the ink from the ink-feed system. When the ink-feed system is filled, any air bubbles in the tubing should be removed by pumping ink into the system to force such through the pen, or the ink should be drawn back into the reservoir and the system refilled. The inkwell should be set at a level to provide a continuous tracing without excess ink, to provide the fastest drying of the recordings. This is most important with fast paper speeds, and particularly when a paper take-up assembly is used, to minimize smearing of the tracings.

An ink dispenser is supplied with the Dynograph assembly when ink recording is ordered. This dispenser is convenient when filling the inkwells. The dispenser should be filled only one-half full to permit tipping the dispenser into the inkwell without squirting the ink outside the inkwell. The inkwell is filled to a level below the lip of the fully inserted cover to prevent a capillary rise of the ink between the cover and the inkwell, which results in an ink flow around the edges of the cover. Any ink splashed above this level during filling of the inkwell should be wiped clean before inserting the cover.

6.5 Ink. The Offner Dynograph ink is a large contributor to the success of the Dynograph inking system. This ink is prepared in the Offner laboratories to a formula which provides a non-clogging, free-flowing and non-corrosive recording ink. Only Dynograph ink should be used with the Dynograph assemblies to eliminate any problems of corrosion, clogging or intermittancy of ink flow during recording. This ink is available in three colors: red, blue, and green. The red ink is generally preferred, being the most free-flowing and best for reproduction by the Ozalid or Bruning processes.

6.6 Maintenance. When the recording assembly is not used, the inkwells should be placed in the fully lowered position. The Dynograph assembly may not be used for periods of several weeks, but the ink system will be immediately operatable providing a sheet of Offner printed curvilinear recording paper is left beneath the tips of the pens. Occasionally, a pen will not write instantly when left unused for a long period of time. This is due to the formation of a small clot of ink at the tip. Pumping the inkwell cover will generally clear the pen, but if the clotting continues it can be cleared by momentarily holding a lighted cigarette, or such a similar heated object, against the tip of the pen.

When such a condition occurs, or with periodic maintenance, it is advisable to remove the inking system for cleaning. The ink in the feed-system may be drawn into the fully lowered inkwell, the pen removed by lifting from the cradle, and the fine ink-tubing pulled free of the pen. The tip of the pen should be placed under a stream of hot water for a few minutes, following this by blowing through the tip of the pen. In case the obstruction is not removed by this procedure, a straight piece of wire, 0.008 inches O.D. or smaller, may be pushed through the tip to free any residue. When cleaning the ink-feed system, it is advisable to remove any ink stains on the writer units or stains which may have splattered over other parts of the writer assembly. These can be removed by washing with a mild solution of warm water and Boraxo. A box of facial tissues is convenient and effective for cleaning splattered ink.

Make certain that the pen is fully seated in the cradle. If the tension spring on the cradle has been bent, re-bend the spring by first removing the pen from the cradle and then bend the lip of the spring towards the back of the cradle, reinstall the pen and check the pen pressure, and re-bend the spring again until the desired pen pressure is obtained. This adjustment is not critical, however, when recording high frequency information, a very light pen pressure is desirable. An excessive pen pressure will result in a lower frequency response in the 60 to 80 cycle-per-second range.

The tubing should not be clear, but should have a milky appearance caused by drawing the tubing to a length several times its normal length. This drawing operation provides a very limp tubing which offers very little resistance to the writer's moving system. The fine tubing may possibly effect the ink flow at wide excursions, or when recording signals above 60 cycles-per-second. A slight rotation of the tubing on the pen will generally correct this condition.

In the event that the inkwell cover becomes worn after a long service life, and will not provide good pumping action with the inkwell, a new inkwell assembly should be ordered and worn inkwell assembly replaced.

7.0 Electric-Sensitive Recording.

7.1 General. Electric-sensitive recording is of value for applications requiring inkless recording and a high frequency response. This type of recording approaches the excellence of ink recordings in that fine continuous tracings are produced even at fast writing rates. A wide range of frequency and amplitude may be accommodated without adjustment of the stylus current controls. Curvilinear electric-sensitive recording is available with the Type 504 paper drive assemblies.

7.2 Description. The curvilinear recording system employs the Teledeltos type of recording paper in which a tracing is made by the stylus due to conduction of an electrical current through the paper. A voltage of approximately 300 volts d-c is applied to the stylus to initiate writing. Once conduction on the surface of the paper occurs, a series current limiting resistor in the circuit of the stylus power supply limits the current to approximately 5 milliamperes for the LOW position of the electric control switch on the stylus control panel, and to approximately 11 milliamperes for the HIGH switch position. The voltage on the stylus drops to only 25 or 40 volts above ground while writing. The voltage is applied to the stylus only when the electric control panel power switch is in the ON position, and when the paper drive is energized.

7.3 Styli. The electric curvilinear stylus is similar in design to the ink pen except for the shape of the tip, and for the addition of a fine stainless steel wire which extends beyond the tip of the stylus to form a writing point surface with the recording paper. This stylus wire extends beyond the back of the stylus to provide spare tips by merely cutting off a used tip, and then pushing the wire through the front of the stylus to the desired length.

7.4 Carbon Deposit on Stylus. A carbon deposit tends to build up at the point of contact of the stylus and the recording paper with electric-sensitive recording. The degree of carbon deposit varies with the stylus current, and consequently the density of the tracing. The minumum acceptable tracing density should always be used to provide the longest period of recording time. The degree of the carbon build-up can be detected in the tracings after an extended period of recording as a step in the rectilinear tracings at one, or more, fixed stylus excursions, or with curvilinear recordings as a wide-line trace.

When this condition occurs, the rectilinear styli may be cleaned free of carbon by scraping with a knife or such similar sharp surface, or the wire tip can be clipped off, and the stylus wire extended to provide a new tip. The curvilinear stylus can be cleaned in most cases by grasping the tip between the fingers and rolling the deposit free of the wire, or with hard deposits by scraping with a knife. The tip may also be clipped and the stylus wire extended to form a new tip.

7.5 Styli Cradle. A metal stylus-retaining assembly is attached to the insulated hub, which in turn is mounted to the moving coil assembly of the Type 506 writer unit. A flexible lead is attached to the stylus retaining assembly, this lead connects to the stylus power terminal board on the Type 506 writer unit, which interconnects the stylus to the stylus power supply.

7.6 Recording Paper. The Offner curvilinear electric-sensitive recording paper is identified by the letters TG (for Teledeltos with Green printed lines) in the Offner part number for the recording paper. These papers are opaque, however, reproductions can be made by using a photographic process.

The curvilinear papers are supplied in rolls 250 feet long. For additional information on these recording papers see the recording paper price lists and individual specification sheets.

7.7 Operate. Set as follows for electric-sensitive recording:

1. The ELECtric control is set to "ON".
2. The LOw-HIgh electric control switch is set to the LO position.
3. The Dynograph switch is turned to MOTOR, which applies the voltage to the styli.
4. The Dynograph switch is then advanced to the LIMITING (Low), or to the OPERATE (High) position as required.

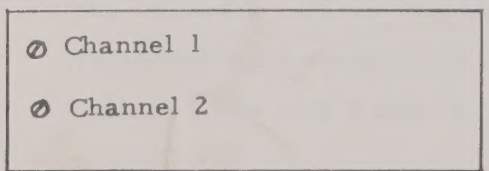
The High position of the electric control switch should only be used when very fast writing rates for very short periods of time are required, and only then to obtain the highest possible resolution. This switch position will result in a very rapid carbon formation on the stylus.

8.0 High Frequency Adjustment. On assemblies employing Type 506W writer units, two controls (R117 and R119) are provided per channel, to enable setting instrument for best high frequency response. On assemblies employing Type 506R writer units, one control (R117) is provided per channel for the same purpose.

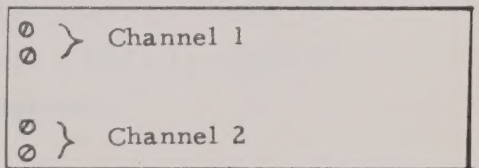
These controls are located on the rear side of front panel and are accessible through the rear compartment of the 542 recorder.

Proper adjustment for each channel may be made as follows:

1. Apply 10 cps sine wave to input terminals.
2. Place hi-freq. in-out switch to "in" position.
3. Adjust amplitude of input signal for approximately 1 cm pen deflection.
4. Change input frequency to 100 cps.
5. Adjust frequency response control (or controls) for same pen deflection as was obtained at 10 cps input. Best final adjustment can be made by alternating between 10 cps and 100 cps and adjusting frequency control until no further variation of amplitude occurs.



Hi-Frequency adjustments on units employing Type 506R writer units. (Accessible thru rear compartment)



Hi-Frequency adjustments on units employing Type 506W writer units (Accessible thru rear compartment)

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INSTRUCTIONS

OFFNER TYPE 5542 DYNOGRAPH RECORDING ASSEMBLY

1.0 General Description

The Type 5542 Dynograph Recording Assembly is electrically similar to the Type 542 Dynograph. The Type 5542 differs from the Type 542 in the following respects:

Power, signal, and remote control connections are made through a 16-pin blue-ribbon connector at the control panel.

Fixed gain operation with the vernier gain adjustment provided as the only sensitivity control.

Input current and frequency response controls are not included.

Wired for remote operation. A momentary contact manually run switch is incorporated for local testing of the recording system.

Fixed recording speeds of 10 mm/sec or 5 mm/sec are established by two possible gear train arrangements in the paper drive assembly.

Four-inch wide folded recording paper is employed in the paper drive assembly.

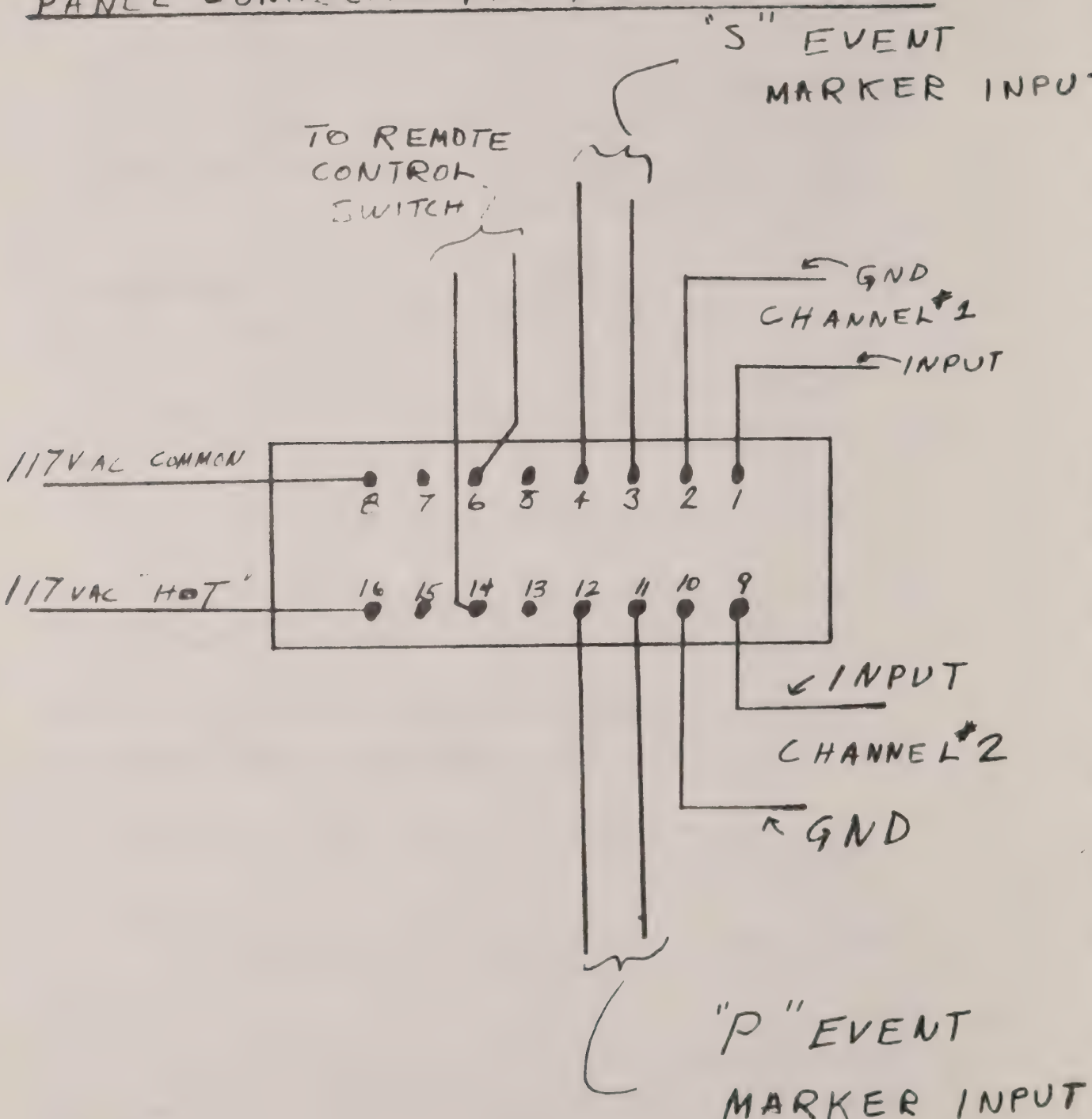
Other differences are described in the succeeding sections.

2.0 Input Connections

The following refer to the 16-pin blue-ribbon panel connector. Amplifier input connections are made to pins 1 and 2 (ground) for channel 1 and pins 9 and 10 (ground) for channel 2.

Event marker input connections are made to pins 3 and 4 for the S marker and pins 11 and 12 for the P marker.

TYPE 5542 DYNOGRAPH RECORDER,
PANEL CONNECTON PIN IDENTIFICATION



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OFFNER ELECTRONICS

2.1 Power and Remote Control Connections

117 volts a-c 60 cps is connected across pins 8 and 16 of the panel connector.

A remote power switch may be connected across pins 6 and 14 of the panel connector.

3.0 Panel Controls

3.1 Power Switch

The power switch must be set to ON for either local or remote operation.

3.2 Gain Control

This is a screwdriver adjustment pre-set at the factory and should not be adjusted unless a change in recording sensitivity is required. The factory setting is for a sensitivity of 2 volts/cm.

3.3 Pen Centering

The pen centering control is provided to compensate for the small drift which may be encountered in the Type 5542 Dynograph. Pen centering may be required after turning on the assembly, but should remain nearly constant once the operating temperature of the assembly has been reached. Applications with high source impedance, and widely varying ambient temperatures may require more frequent adjustment of this control.

A small amount of pen centering may be performed mechanically at the writer unit by means of the centering lever on its side.

4.0 Changing Paper Speed

(a) Disconnect the panel connector. Loosen and remove the six panel retaining screws by which the amplifier is mounted in the enclosure.

(b) Carefully lift the amplifier assembly out of the enclosure. Disconnect the amplifier from the writer units by removing the wiring harness plug from its receptacle within the enclosure.

(c) Loosen the socket-head screw at the end of the drive roller shaft. This will free the two output gears of the paper drive. Transpose these gears to conform to the speed requirements. See Figure 4.0-(5542) for the proper arrangement of these gears. Reassemble the Dynograph after completing the rearrangement of the gears.

5.0 Trouble Shooting (Electrical)

This section cites probable trouble symptoms and the necessary checks and remedies required to isolate and eliminate the source of trouble.

Recommended Test Equipment: V.O.M. with a-c and d-c scales. Check continuities with X100 resistance range.

Symptom: Complete functioning failure, i.e., no response to signals and inoperative paper drive.

Checks and Remedies:

(a) Check for operation when Manual Run switch is actuated. Failure to operate here may indicate power line failure or fuse F1 blown.

(b) Test fuse F1, replace if necessary.

(c) Disconnect the connecting cable from the panel of the 5542; then test for line voltage between terminals 8 and 16. Failure here will indicate power failure in the system used with the 5542.

5.0 Trouble Shooting (Electrical) (cont'd.)

(d) With the same conditions as in step (c), set the power switch to ON. Check for electrical continuity between terminals 14 and 16 at the panel. Likewise check for continuity between terminals 6 and 8. Failure to show continuity at terminals 14 and 16 will indicate a defective fuse F1, its holder, or power switch S1 and possible wiring failure to these parts. Failure to show continuity across terminals 6 and 8 will indicate failure of switch S2 or wiring associated with this part.

Symptom: Ripple present in recorder tracings. Pens and pen motors are operating about the base line.

Checks and Remedies:

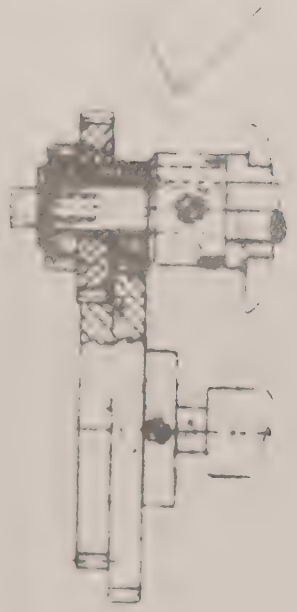
(a) Test for ripple with a short circuit across the panel connector terminals 1 and 2 (9 and 10 for channel 2) at the panel. If the short circuit eliminates the ripple, the ripple is originating at the signal source and not the recorder. If the ripple persists, replace capacitors C1 and C2.

Symptom: Ripple is present in large deflections of the recording pens.

Checks and Remedies:

(a) Short input terminals 1 and 2 at the panel connector (9 and 10 for channel 2); then deflect each pen 2 to 3 cm from the base line. If the ripple does not appear, the source of ripple was the signal source. If the ripple is present yet, test for its presence with the pen deflected in the opposite direction. Ripple present with counterclockwise deflection of the pen only,

LOW SPEED GEAR ARRANGEMENT



HIGH SPEED GEAR ARRANGEMENT

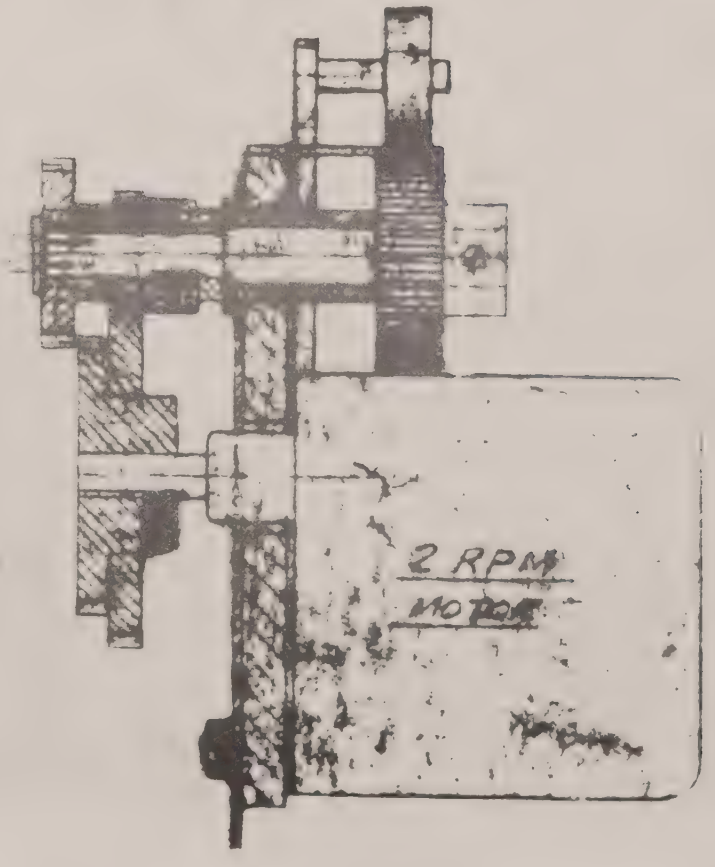


FIG. 4.0 – 5542

5.0 Trouble Shooting (Electrical) (cont'd.)

Checks and Remedies: (cont'd.)

will indicate a defective capacitor C3. Ripple present with clockwise deflection of the pen will indicate a defective capacitor C4. If the ripple is present with both deflection directions, the capacitors C3 and C4 may first be suspected, then C1 and C2.

Symptom: Excessive drift.

Checks and Remedies:

(a) Short the input terminals 1 and 2 at the panel connector (terminals 9 and 10 for channel 2). Lack of drift with the input shorted will indicate the drift originates with the signal source. Signal source impedance greatly affects the drift and should be kept as low as possible.

(b) If the drift persists, one or both of the input transistors T101 and T102 (T201 and T202 for channel 2) are defective.

Symptom: Noise.

Checks and Remedies:

Treat the noise symptom the same as the drift symptom.

LOT EQUIPMENT

REF. NO.

C5; C204, C206

D5

L2

MP1

P3

R144 (R244)

S2

T103 (T203)

F1

NOTE:
. EVENT MARKERS & ASSOCIATED WIRING SUPPLIED ONLY WHEN ORDERED.

BLACK

BLUE

CHANNEL B DYNO.

P EVENT MARKER

CHANNEL A DYNO.

CHANNEL A WIRES LOCATED NEAREST AMPLIFIER (T-PRIMARY)

P3

S EVENT MARKER

P1

F1

S1

ON

S2

MANUAL RUN

R130

R123

R124

T101

T103

T105

T107

R144

C104

R143

GAIN SET

R125

R126

T102

T104

T106

T108

R135

R112

105

R127

CHANNEL 1

CHANNEL 2

D4

D5

D1

C1

C2

REVISIONS	DATE	BY	APP
ADD P1 & P3			

MAT.	DR'N J.A.P.
FIN.	CH'D J.J.
	APP.
SCALE	DATE DRAWN 1 FEB. '61
CL. UNLESS OTHERWISE SPEC.	
FRAC. ± DEC. ±	

OFFNER ELECTRONICS INC.
CHICAGO

DYNOGRAPH ASSEMBLY CIRCUIT
DUAL CHANNEL

No. 5642-1000-1

5642-1000-1

LIST OF COMPONENTS, TYPE 5542 WHEEL THERMO-SCANNER UNIT

CIRCUIT 5542-1000-1

REF. NO.	DESCRIPTION	OFFNER PART NO.
	CAPACITORS	
C1, 2	Capacitor, Electrolytic, 500 mfd., 15 vdcw	CR750-15
C3, 4	Capacitor, Electrolytic, 10,000 mfd., 6 vdcw	CQ910-6A
C5	Capacitor, 0.85 mfd., 220 vac	CK485-2
C104, 204 105, 205	Capacitor, 0.05 mfd., 100 vdcw	CEMP350-1
C106, 206	Capacitor, 0.02 mfd., 100 vdcw	CEMP320-1
	RECTIFIERS	
D1	Rectifier, Selenium, Full-Wave Power	D16S4X1
D2, 3, 4, 5	Rectifier, Silicon, 500 ma, 400 PIV	DM5A4
	FUSES	
F1	Fuse, MDL3/8 Retainer, Fuse, Screw Panel	FAS3/8 PFC-3
	TRANSFORMERS	
L1	Transformer, Power	LPX542B
L2	Transformer, Power	LPX542A
	MOTORS	
MR1	Motor, Paper Drive, 2 rpm, 115 vac, 60 cps	MRR6-2

LIST OF COMPONENTS, TYPE 5542 WHEEL THERMO-SCANNER UNIT

CIRCUIT 5542-1000-1

REF. NO.	DESCRIPTION	OFFNER PART NO.
	CONNECTORS	
P1	Connector, Chassis, 16 Pin, Male	PUC16M
P2	Connector, Chassis, 11 Pin, Female Connector, Cable, 11 Pin, Male	PN-12 PNP-12
	RESISTORS	
R123, 223	Resistor, Composition, 6.8 Megohms	RC568
R124, 224	Resistor, Composition, 1 Megohm	RC510
R125, 225	Resistor, Variable, 5,000 Ohms	RV250L
R126, 226	Resistor, Composition, 2,200 Ohms	RC222
R128, 228	Resistor, Composition, 8,200 Ohms	RC282
R129, 229	Resistor, Variable, 200,000 Ohms	RV420T
R130, 230	Resistor, Composition, 8,200 Ohms	RC282
R131, 231	Resistor, Composition, 12,000 Ohms	RC312
R132, 232	Resistor, Composition, 1,500 Ohms	RC215
R133, 233	Resistor, Composition, 10,000 Ohms	RC310
R134, 234	Resistor, Composition, 1,800 Ohms	RC218
R135, 235	Resistor, Composition, 100,000 Ohms	RC410
R136, 236 R137, 237	Resistor, Composition, 1,500 Ohms	RC215
R138, 238	Resistor, Composition, 100,000 Ohms	RC410
R139, 239	Resistor, Composition, 10,000 Ohms	RC310
R140, 240	Resistor, Composition, 100,000 Ohms	RC410

LIST OF COMPONENTS, TYPE 5542 WHEEL THERMO-SCANNER UNIT

CIRCUIT 5542-1000-1

REF. NO.	DESCRIPTION	OFFNER PART NO.
R142, 242	Resistor, Neg. Temp. Coefficient, 3,820 Ohms, 25°C.	RN23A
R143, 243	Resistor, Composition, 47,000 Ohms	RC347
R144, 244	Resistor, Composition, 120,000 Ohms	RC412
	SWITCHES	
S1	Switch, Toggle, S. P. S. T.	ST1X1
S2	Switch, Push-Button, D. P. S. T.	SU2X2A
	TRANSISTORS	
T101, 201 T102, 202	Transistor, NPN, Low Power	TG3
T103, 203 T104, 204	Transistor, PNP, Low Power	TG12
T105, 205	Transistor, NPN, Low Power	TG5
T106, 206	Transistor, NPN, Low Power	TG2
T107, 207 T108, 208	Transistor, PNP, Power	TG4
	Retainer, Power Transistor	PNT-3
	Washer, Transistor Insulating	HVMT-1

LIST OF COMPONENTS, TYPE 5542 WHEEL THERMO-SCANNER UNIT

CIRCUIT 5542-1000-1

REF. NO.	DESCRIPTION	OFFNER PART NO.
	MISCELLANEOUS	
	Knob	HKK-4A
	Writer Unit, 506RA	Y506RA
	Stylus, Ink	Y5210
	Cradle Assembly	U506R-334B

PATENT NOTICE F522-61

These instruments described herein are covered by one or more of the following patents:

U.S.	2488430,	2438875,	2262958,	2697908,	2739478,	2517703,
	2761645,	2712309,	2517702,	2662372,	2688729,	2573596,
	472651,	589322,	436803,	426325,	597455,	464435,
	672082,	648297,	68862			
French	969420					
British	682763,	675368,	678505			
Canadian	512646					

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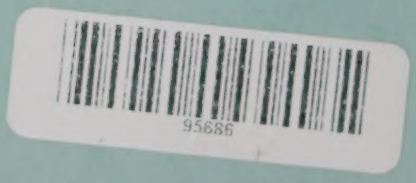
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